# Model for *Pinus sylvestris* stands
# High Ebro Basin (Spain)

## Model

Psylvestris_stand__High_Ebro_Basin__v01.py

## Model description

- Specie: *Pinus sylvestris* L.
- Spanish Forest Inventory (SFI) code: 21
- Geographical area: High Ebro Basin
- Geographical area (administrative): Burgos and Álava

## Model type

- Category: stand growth
- Model level: stand
- Reproduction methods: seedling forest
- Stand structure: even-aged stands
- Species composition: monospecific stands
- Forest origin: natural and plantation

## Model requirements and recommended use

- Initial inventory requirements: age, mean height and density of the plot
- Geographical area: Burgos, Álava, closer places and another places with similar characteristics (assuming differences)
- Stand type: monospecific stands
- Execution recommended time: 5 years executions (survival and growth equations developed by using that criteria)
- Site Index is defined as top height at a base age of 100 years

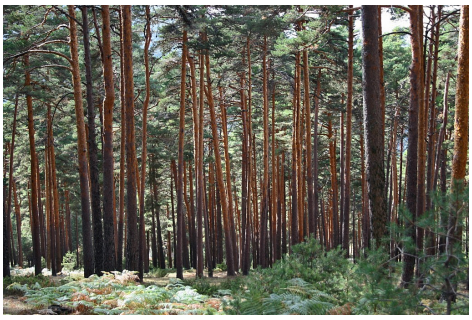


Figure 1: *Pinus sylvestris* stand, by ClémentGodbarge commonswiki assumed (based on copyright claims). Own work assumed (based on copyright claims)., CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=323975

Figure 2: Details of *Pinus sylvestris*, public domain, https://commons.wikimedia.org/w/index.php?curid=529150

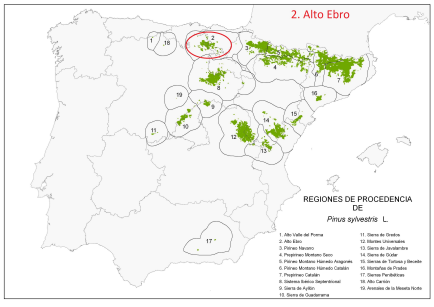
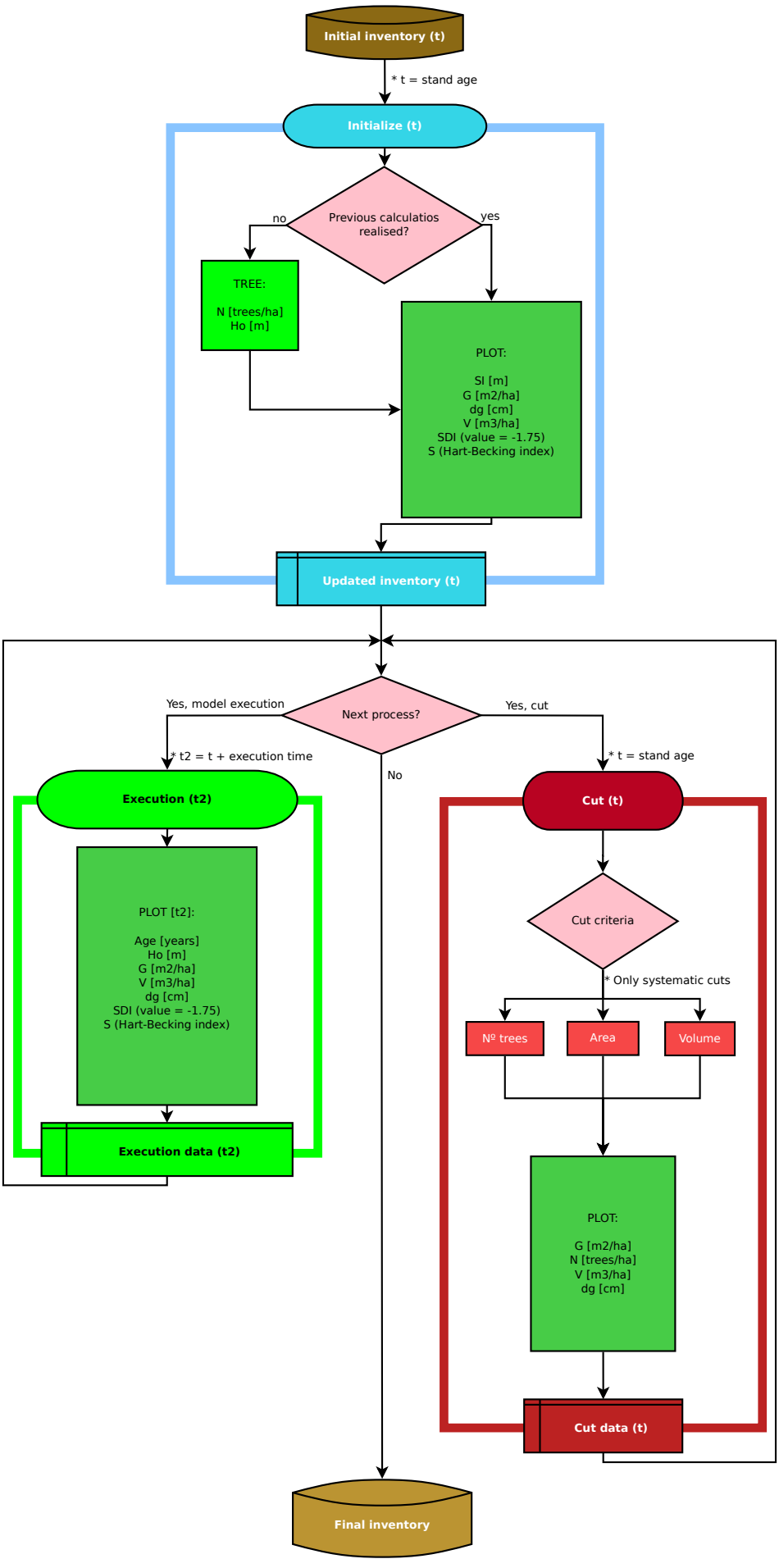



Figure 3: Provenance regions of *Pinus sylvestris* in Spain, by MAPA

# Bibliography

**Model components:**


- **Calculations by using tree data** (just in cases when that information is not available at the initial inventory):
  Density and Dominant Height
- **Site Index and Quality Index equations**:
  Bravo F (1998). Modelo de producción para Pinus sylvestris L. en el Alto Valle del Ebro
- **Dominant Height Growth equation**:
  Bravo F (1998). Modelo de producción para Pinus sylvestris L. en el Alto Valle del Ebro
- **Basal Area Growth equation**:
  Bravo F, Montero G (2003). High-grading effects on Scots pine volume and basal area in pure stands in northern Spain. Annals of forest science, 60(1), 11-18
- **Volume and Volume Growth equation**:
  Bravo F, Montero G (2003). High-grading effects on Scots pine volume and basal area in pure stands in northern Spain. Annals of forest science, 60(1), 11-18
- **Quadratic Mean Diameter equation**:
  Bravo F, Montero G (2003). High-grading effects on Scots pine volume and basal area in pure stands in northern Spain. Annals of forest science, 60(1), 11-18
- **Value for Reineke Index equation**:
  del Río M, Montero G, Bravo F (2001). Analysis of diameter–density relationships and self-thinning in non-thinned even-aged Scots pine stands. Forest Ecology and Management, 142(1-3), 79-87
- **Hart Index equation**:
  Standard equation
- **Harvest equations**:
  Harvest equations developed by using equations mentioned before.


Initial inventory (t)
* t = stand age
Initialize (t)
Previous calculatios realised?
no
yes
TREE:
N [trees/ha]
Ho [m]
PLOT:
SI [m]
G [m2/ha]
dg [cm]
V [m3/ha]
SDI (value = -1.75)
S (Hart-Becking index)
Updated inventory (t)
Next process?
Yes, model execution
Yes, cut
No
* t2 = t + execution time
* t = stand age
Execution (t2)
PLOT [t2]:
Age [years]
Ho [m]
G [m2/ha]
V [m3/ha]
dg [cm]
SDI (value = -1.75)
S (Hart-Becking index)
Execution data (t2)
Cut (t)
Cut criteria
* Only systematic cuts
Nº trees
Area
Volume
PLOT:
G [m2/ha]
N [trees/ha]
V [m3/ha]
dg [cm]
Cut data (t)
Final inventory

## Contacts

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## Interest Links

**SIMANFOR - Support system for simulating Sustainable Forest Management Alternatives. Accessed 11 May 2021, in** `https://www.simanfor.es/`

**iuFOR - Sustainable Forest Management Research Institute UVa-INIA. Accessed 11 May 2021, in** `http://sostenible.palencia.uva.es/`

**ETSIIAA Palencia - Higher Technical School of Agricultural Engineering of Palencia. Accessed 11 May 2021, in** `http://etsiiaa.uva.es/`

**UVa - University of Valladolid. Accessed 11 May 2021, in** `https://www.uva.es`